TTP-244 Plus

THERMAL TRANSFER BAR CODE PRINTER

Service Manual

TTP-244 Plus Bar Code Printer Service Manual

Table of Contents

1. FUNDAMENTALS ABOUT THE SYSTEM 1

1.1 Features of the TTP/TDP-244 Plus 1

1.2 Model Naming Syntax 1

1.3 Overview 2

1.3.1 Front View 2

1.3.2 Rear View 3

1.4 Basic Specifications 4

1.5 Effective Print Area 5

1.6 Available Bar Codes 5

1.7 Various Sensors 6

2. SUPPLY SPECIFICATIONS 8

2.1 Types of Paper 8

2.2 Specifications 8

2.3 Ribbon Sizes and Shapes 10

3. ELECTRONICS 11

3.1 Summary of Board Connectors 11

3.2 Pin Configuration 13

4. MECHANISM 15

4.1 Mainboard Replacement 15

4.2 DC Motor Replacement 17

4.3 Print Head Replacement 21

4.4 Ribbon Rewind Spindle Encoder Replacement 23

4.5 Felt Fabric Replacement 24

4.6 Stepping Motor Replacement 26

4.7 Black Mark Sensor / Gap Sensor (Receiver) Replacement 27

4.8 Ribbon Sensor (Receiver) Replacement 28

4.9 Ribbon Sensor (Transmitter) / Gap Sensor (Transmitter) Replacement 30

4.10 Platen Replacement 31

5. TROUBLE SHOOTING 33

5.1 Trouble Shooting 33

5.2 Calibrate the Gap Register 34

5.3 Self-test 34

5.4 Ram Clear 34

5.5 Diagnosis Operation Procedure 34

5.6 Testing Sensors 35

UPDATE HISTORY 36

1. FUNDAMENTALS ABOUT THE SYSTEM

1.1 Features of the TTP/TDP-244 Plus

1. TTP-244 Plus bar code printer prints bar codes, characters, logos, on various types of labels and tickets by direct thermal or thermal transfer printing.
2. TTP-244 Plus adopts a “BASIC-like” high level programming language to help users programme the desired label forms with ease.
3. TTP-244 Plus bar code printer can be connected to a personal computer or an optional LCD keyboard to execute the programs downloaded in the printer’s memory. The printer is equipped with the following standard devices:gap transmissive sensor, black mark reflective sensor and ribbon end sensor.
4. TTP-244 Plus bar code printer provides a selection of optional features, including portable LCD keyboard, etc.

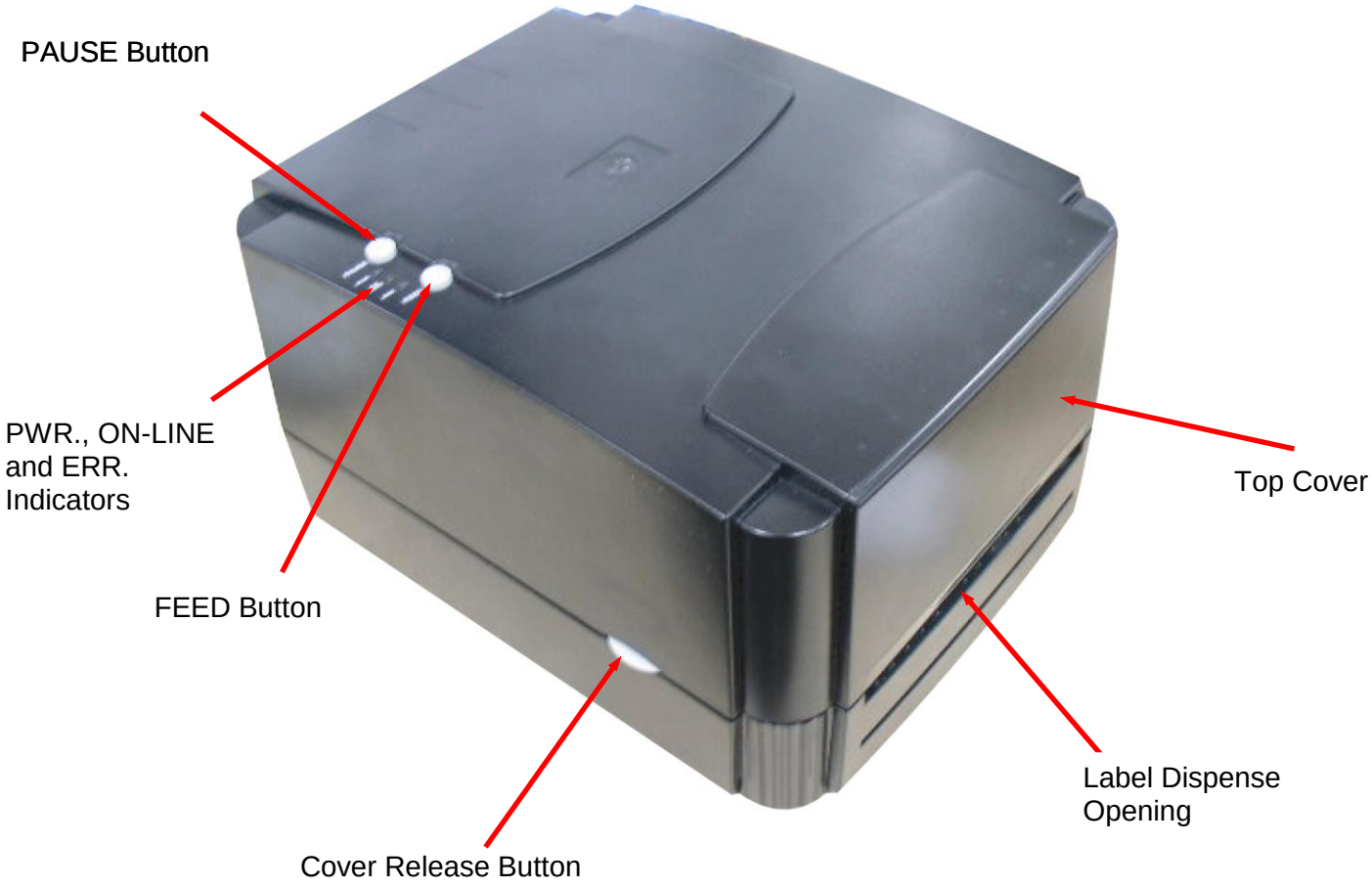
1.2 Model Naming Syntax

T	**T**	**P**	**–**	**2**	**4**	**4**	**Plus**
		(1)		(2)	(3)	(4)	

(1) Print method:
TTP – Thermal Transfer Printing
TDP – Thermal Direct Printing
(2) Resolution of print head (DPI)
(3) Maximum print width (Inch)
(4) Maximum print speed (Inch/Sec)

1.3 Overview

1.3.1 Front View



1.3.2 Rear View

1.4 Basic Specifications

- Thermal transfer and direct thermal printing
- High dot density printing (203 dots/inch)
- Selectable print speeds at 2.0”, 3.0” or 4.0” per second
- Supports RS-232 and USB interface
- Maximum media width up to 4.49” (114 mm)
- Adjustable label edge guide
- International character sets
- Print area is 4.09”W x 40”L (without any file downloaded in the printer memory)
- User selectable bar code ratios and heights
- Prints on labels or tickets
- Equipped with black mark sensor
- Label stock and thermal transfer ribbon are easy to install
- Internal label print counter
- Self test and hex dump mode
- Downloadable fonts from label design software

Electronics/Communication Specifications

- Electrical

DC Motor: DC24V

Memory:

—DRAM: 8 Mb

—Flash: 2 Mb

Adapter 100~240VAC±10%, 50~60Hz

Regulations: FCC Class A, CE Class A, C-Tick Class A, TÜV/GS, CCC

- Communications Interface:

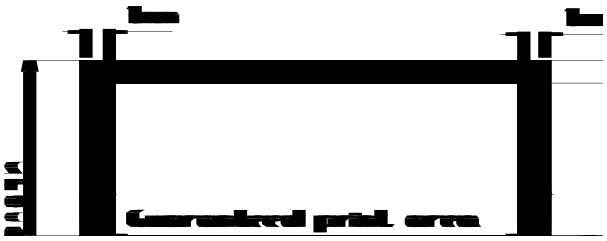
* RS-232/USB

* RS-232/Centronics (factory option)

- RS-232 Interface Pin Configuration:

Host Function	9 Pin	25 Pin		9 Pin	Printer Function
				1	+5V
RxD	2	3	←	2	TxD
TxD	3	2	→	3	RxD
DTR	4	20	→	4	DSR
GND	5	7		5	GND
DSR	6	6	→	6	RDY
RTS	7	4	←	7	N/C
CTS	8	5	←	8	RDY
				9	+5V

1.5 Effective Print Area



Label/Ticket Length	12mm~2286mm
Effective Print Length	10mm~2284mm
Label/Ticket Width	25mm~103mm
Effective Print Width	23mm~101mm
No Print Area	1mm

1.6 Available Bar Codes

1D bar code:

- Code 39
- Code 93
- Code 128 UCC
- Code 128, Subsets A, B, and C

- Codabar
- Interleaved 2 of 5
- EAN-8, EAN-13, EAN-128
- UPC-A, UPC-E
- EAN and UPC with 2 or 5 digits add-on
- MSI
- Postnet
- Plessey
- China POST

2D bar codes:

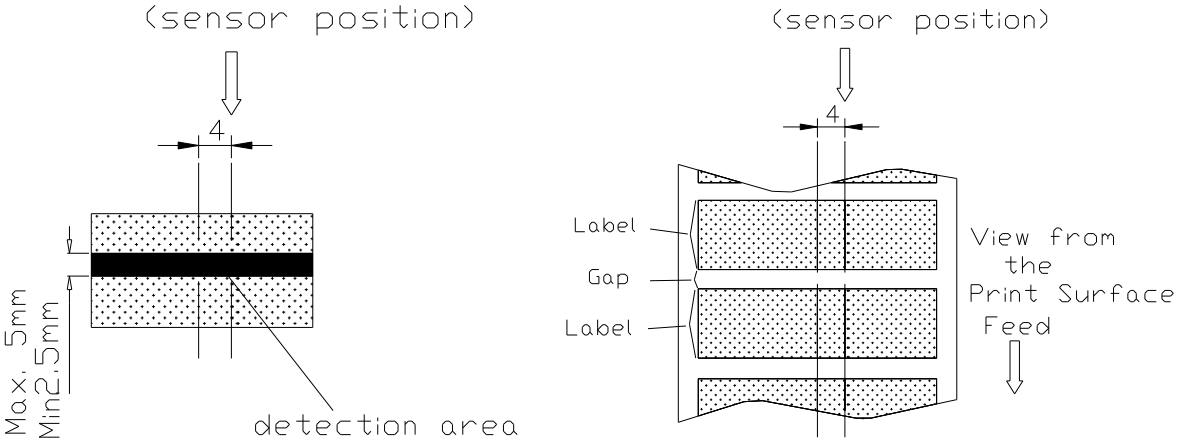
- Maxicode
- DataMatrix
- PDF-417
- QR code

1.7 Various Sensors

Feed Gap Sensor

The feed gap sensor detects a label gap to locate the starting print position of the next label. The sensor is mounted 4 mm off the center line of the main mechanism.

In case of Label

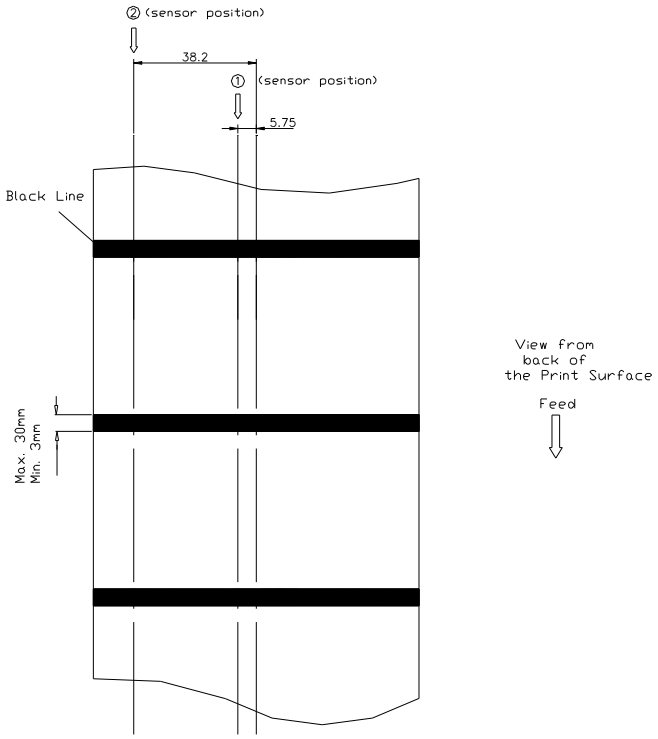


Black Mark Sensor

The black mark sensor locates the position of label by emitting infrared rays onto the black mark at the back of the ticket. The sensor is mounted 5.75 mm off the center line of the ticket roll width on the mechanism.

In case of Ticket

The default sensor position is (1) as shown on the figure below. To change to the (2) position, the customer should notify the manufacturer in advance. There can be only one position for the sensor. Once the sensor position is agreed upon, it can not be changed afterwards.



Ribbon End Sensor

The sensor detects the end portion of the ribbon. The ribbon end must be transparent.

Label End Sensor

The sensor detects the end portion of the label.

Ribbon encoder

The encoder is used to detect if the ribbon is broken.

2. SUPPLY SPECIFICATIONS

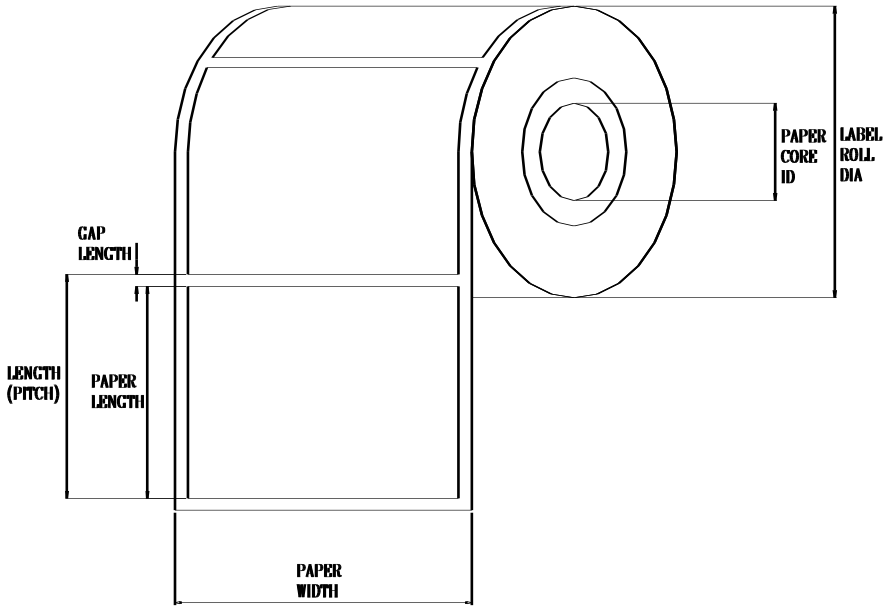
2.1 Types of Paper

Two types of media are available for TTP-244 Plus: label and ticket.
In TTP-244 Plus, there are two types of sensors for paper: gap sensor and black mark sensor.
Label and ticket can be further classified into direct thermal type or thermal transfer type.

2.2 Specifications

Items	Label
Paper Width	Max.114mm
	Min. 25.4mm
Length (Pitch)	10～1016mm
Paper Thickness	0.25 mm
Paper Weight	Max 240 g/m^2
Max. Roll Diameter (1" core)	Inner roll diameter. Max 4.3" (110mm) External roll diameter. Max 8.4" (214mm)
Roll Up Method	Print surface wound outside as standard
Paper Core ID.	ϕ25.7±0.3mm

Note:
(1). The width and thickness quoted above are said of the label plus its backing paper.
(2). Likewise, the approval of label entails that of its backing paper.
(3). Paper shape is as shown on next page:


PAPER
CORE
ID
LABEL
ROLL
DIA
GAP
LENGTH
LENGTH
(PITCH)
PAPER
LENGTH
PAPER
WIDTH

2.3 Ribbon Sizes and Shapes

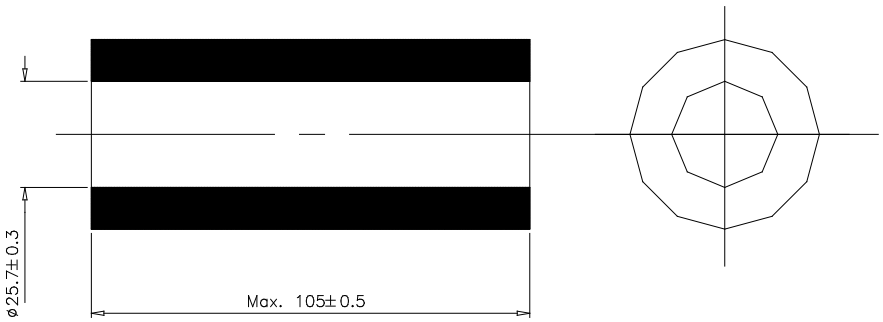
Item	Specifications
Ribbon shape	Spool type
Ribbon width	Max. 110mm
	Min. 40mm
Ribbon winding width	Max. 110mm
	Min. 40mm
Leading tape	Polyester film, 335±5mm long
End tape	Polyester film (transparent), 250±5mm long
Max. ribbon OD.	ϕ67mm
Winding method	Ink surface to be wound outside

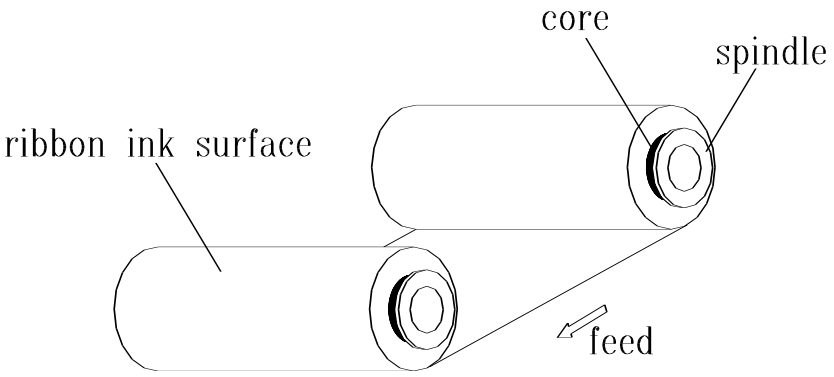
Note: The maximum length of ribbon depends on its thickness and core outside diameter.

The formula below defines the correlation between ribbon roll length and ribbon core diameter.

$L = \frac{(D^2 - d^2) \times \pi}{4t}$, where

L = Ribbon length
D = Max. roll diameter
d = Ribbon core outside diameter
t = Ribbon thickness

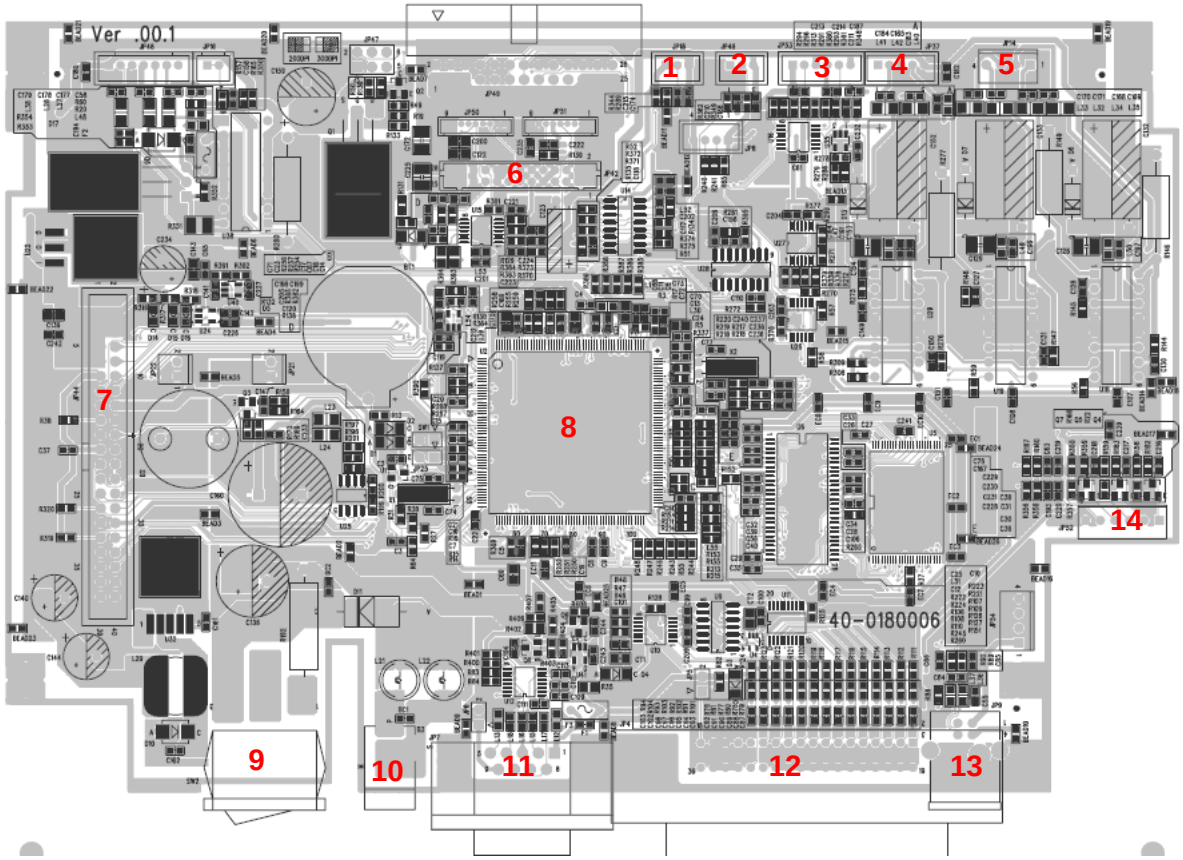




3. ELECTRONICS

3.1 Summary of Board Connectors

Main board



Connector	Description	Remark
1	Ribbon sensor connector	JP18
2	Black mark sensor connector	JP46

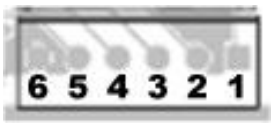
Pin	Description	Voltage
1	Power	5V
2	Black mark sensor receiver	No paper or black mark : 3.1~3.2V Detect paper: 0~0.3V
3	GND	0V

3 — Gap sensor connector — JP53

Pin	Description	Voltage
1	GND	0V
2	Gap sensor emitter	Emitter on : 0.7~1.8V Emitter off: 2.4~2.7V
3	Power	5V
4	GND	0V
5	Gap sensor receiver	No paper or gap: 3.1~3.2V Detect paper: 0~0.3V
6	Power	5V

4	Ribbon encoder sensor & DC motor connector	JP37
5	Stepping motor connector	JP14
6	Print head connector	JP42
7	SD memory card module connector	JP44
8	Micro processor	U2
9	Power switch	SW2
10	Power supply output (24V DC) connector	B3
11	RS-232C connector	JP7
12	Centronics port connector (Option)	JP4
13	USB connector	JP9

14 — Push button connector — JP52



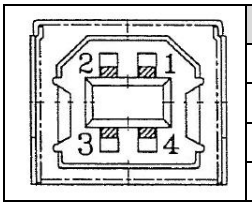
Pin	Description	Voltage
1	LED green (PWR)	LED light on: 2.0~2.2V LED light off: 0~0.3V
2	LED green (ONLINE)	LED light on: 2.0~2.2V LED light off: 0~0.3V
3	LED red (ERR)	LED light on : 2.0~2.2V LED light off: 0~0.3V
4	Pause switch	0V: Push key 3.3V: Stand-by
5	Feed switch	0V: Push key 3.3V: Stand-by
6	GND	0V

3.2 Pin Configuration

RS-232C

PIN	CONFIGURATION
1	+5 V
2	TXD
3	RXD
4	CTS
5	GND
6	RTS
7	N/C
8	RTS
9	N/C

USB



PIN	CONFIGURATION
1	N/C
2	D-
3	D+
4	GND

Centronics

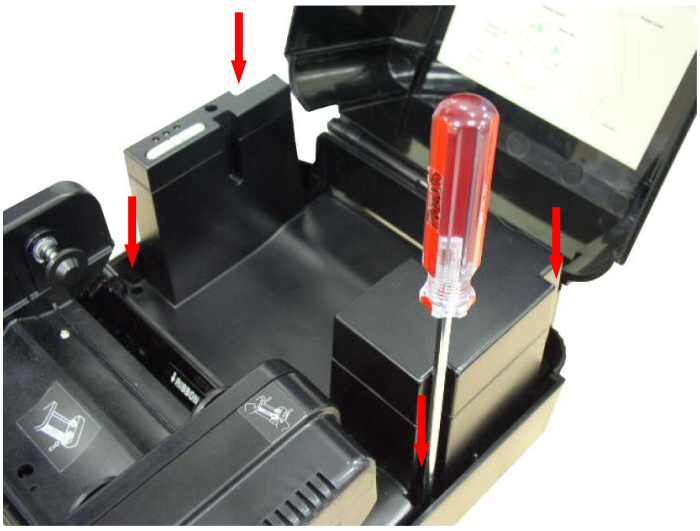
Pin	SPP Mode	Nibble	In/Out	Function
1	Strobe	N/A	In	A **low** on this line indicates that there are valid data at the host. When this pin is de-asserted, the +ve clock edge should be used to shift the data into the device.
2-9	Data 0-7	N/A	In	Data Bus. Single-directional.
10	Ack	N/A	Out	A **low** on this line indicates that there are valid data at the Device. When this pin is de-asserted, the +ve clock edge should be used to shift the data into the host.
11	Busy	N/A	Out	When in reverse direction, a **high** indicates data, while a **low** indicates a command cycle. In forward direction, it functions as PtrBusy.
12	Paper Out / End	N/A	Out	When **low**, device acknowledges reverse request.
13	Select	N/A	Out	Extensibility flag
14	Ground	N/A	GND	
15	No Defined	N/A	N/A	
16-17	Ground	N/A	GND	Ground
18	No Defined	N/A	N/A	
19-30	Ground	N/A	GND	Ground
31	No Defined	N/A	N/A	

32	Error / Fault	N/A	Out	A **low** set by the device indicates that the reverse data is available
33-35	Ground	N/A	GND	Ground
36	No Defined	N/A	N/A	

4. MECHANISM

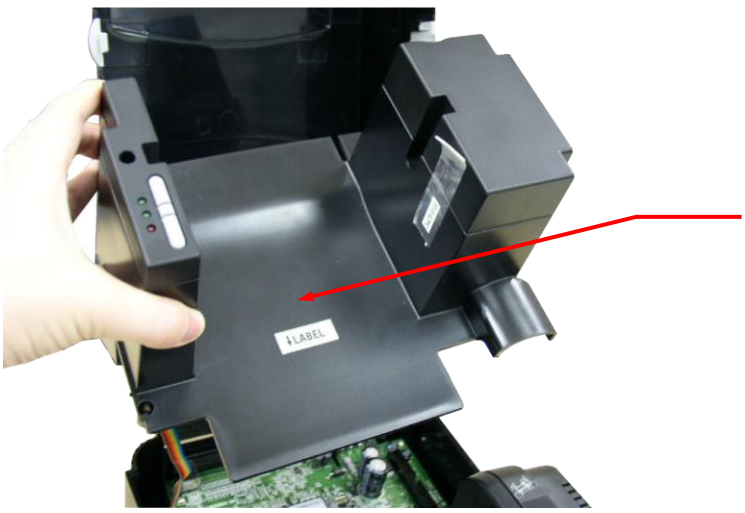
4.1 Mainboard Replacement

1. Turn off the printer power.
2. Remove the power cord and RS-232 and/or USB port cable.
3. Open the top cover of the printer.
4. Remove the four screws of the internal label roll mount.

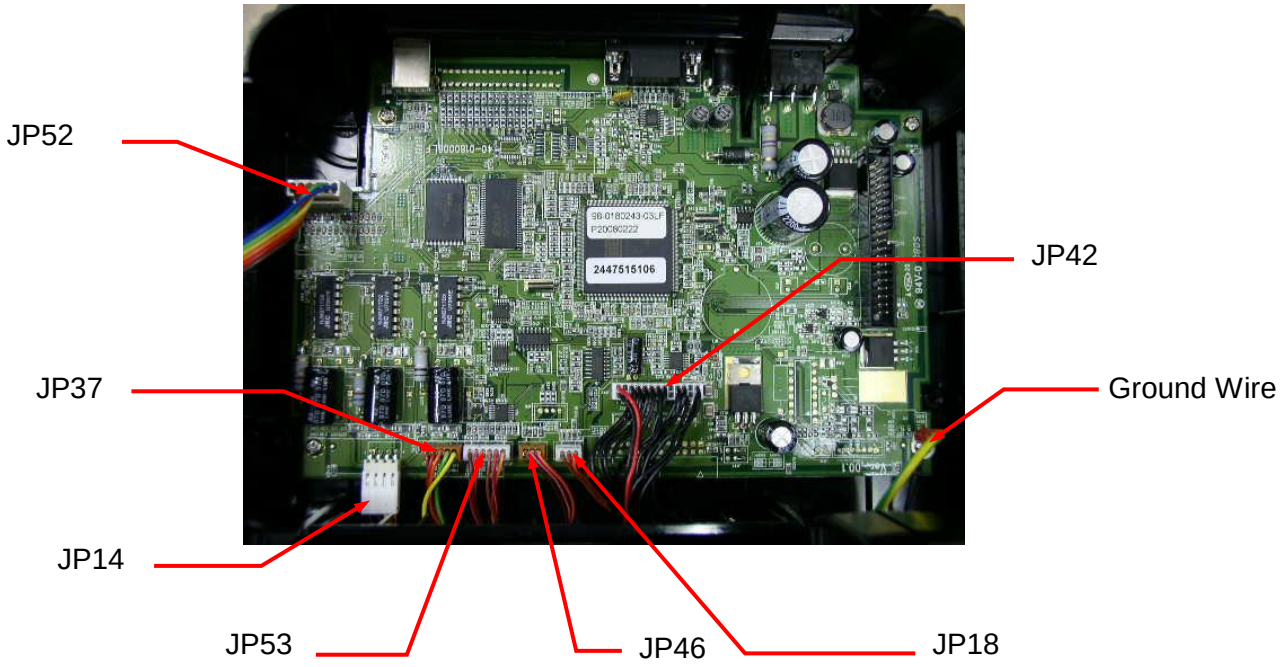


Remove screws of the label roll mount

5. Move the mechanism about 5 mm in the label feed direction.
6. Take out the internal label roll mount.



7. Remove all connectors on the main board.



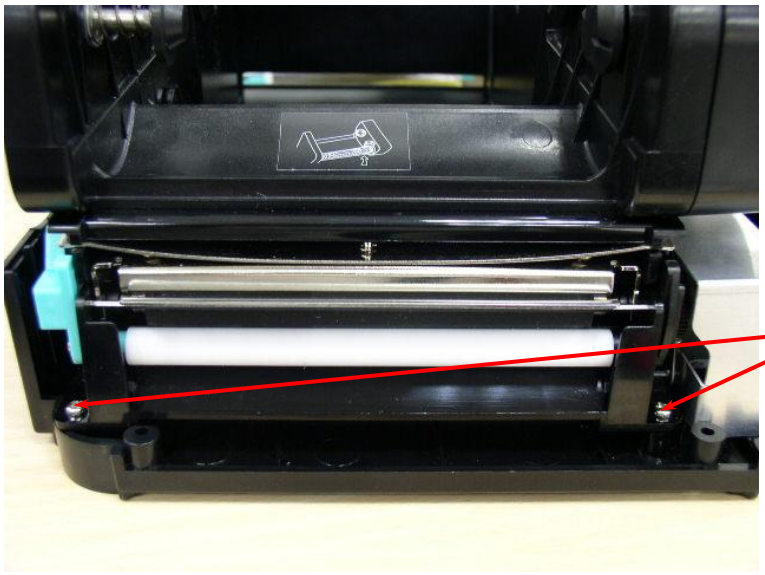
Remark	Description
JP52	Push button connector
JP37	Ribbon encoder sensor & DC motor connector
JP14	Stepping motor connector
JP53	Gap sensor connector
JP46	BLine sensor connector
JP18	Ribbon sensor connector
JP42	Print head connector

8. Remove the screw of ground wire on the main board.
9. Remove the rest three screws on the mainboard.
10. Replace the mainboard.
11. Reassemble the internal label roll mount in the reverse procedures of the removal.

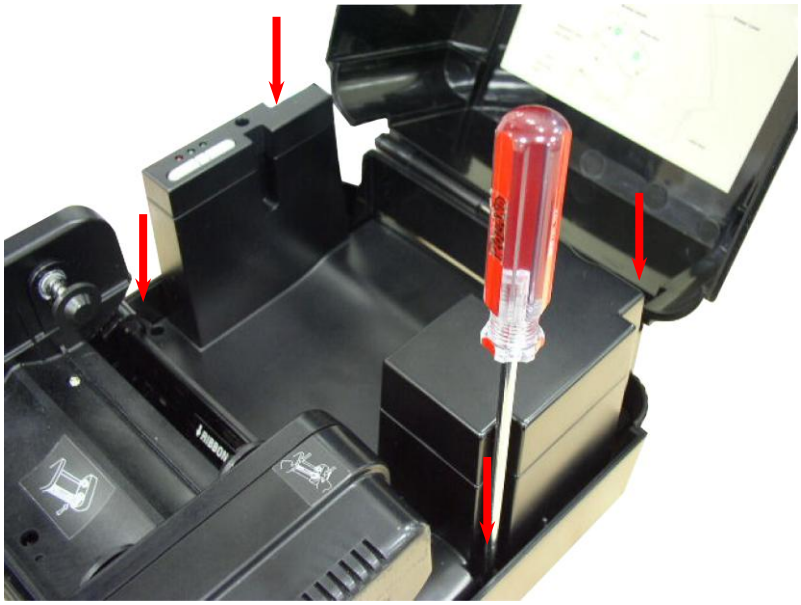
4.2 DC Motor Replacement

1. Turn off the printer power.
2. Remove the power cord and RS-232 and/or USB port cable.
3. Open the top cover of the printer.
4. Remove the printer front panel.

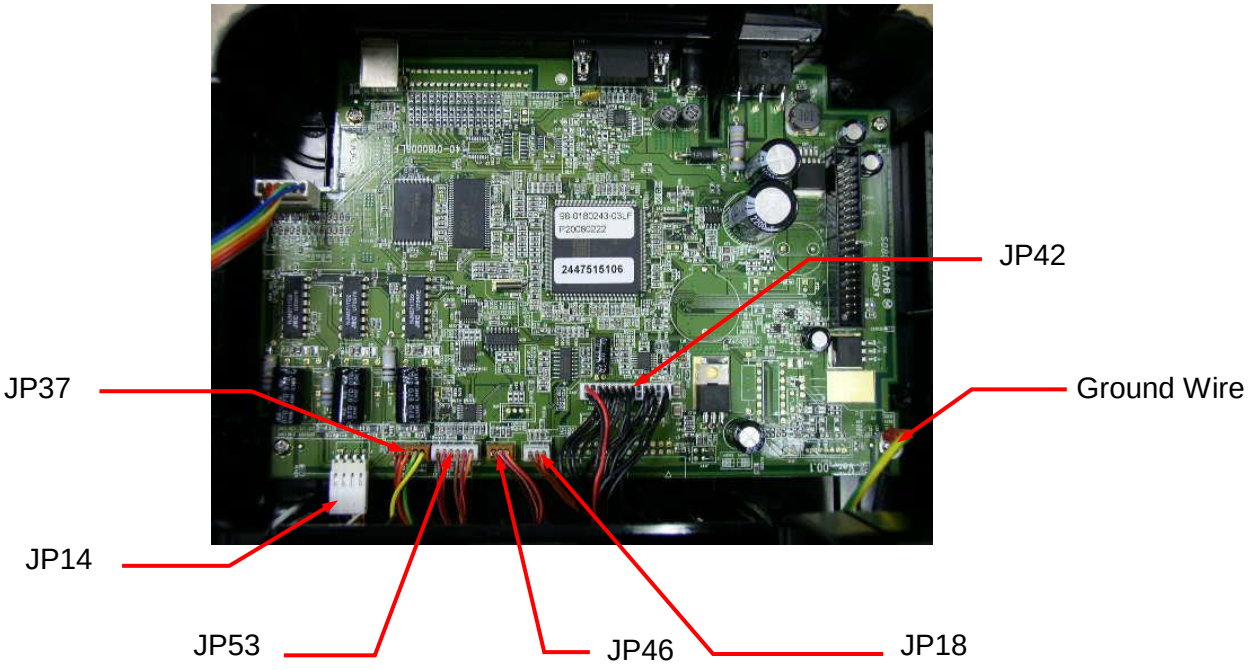
5. Remove the screws in the lower left, lower right corners of the main mechanism.



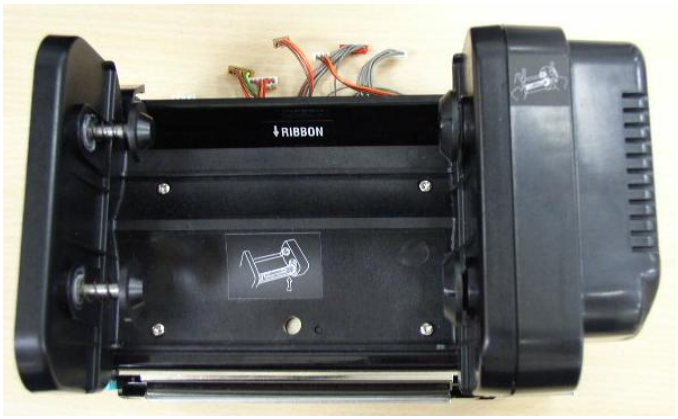
6. Remove all four screws of the internal label roll mount.



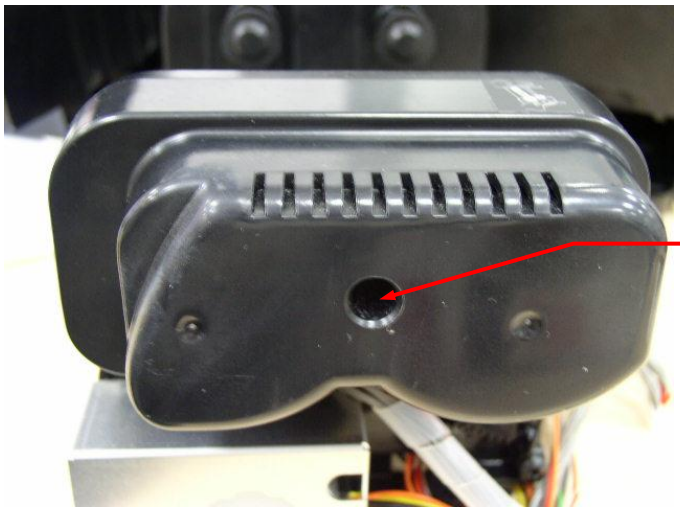
7. Move the mechanism in the label feed direction about 5 mm.
8. Take out the internal label roll mount and remove connectors as below.
9. Remove the screw of ground wire on the mainboard.



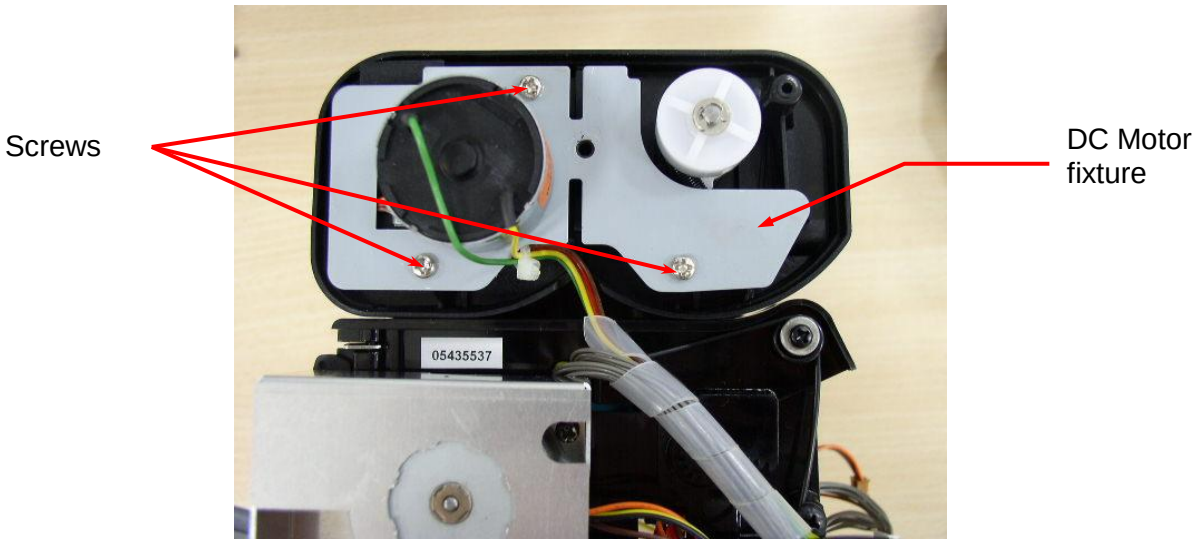
10. Take out the mechanism.



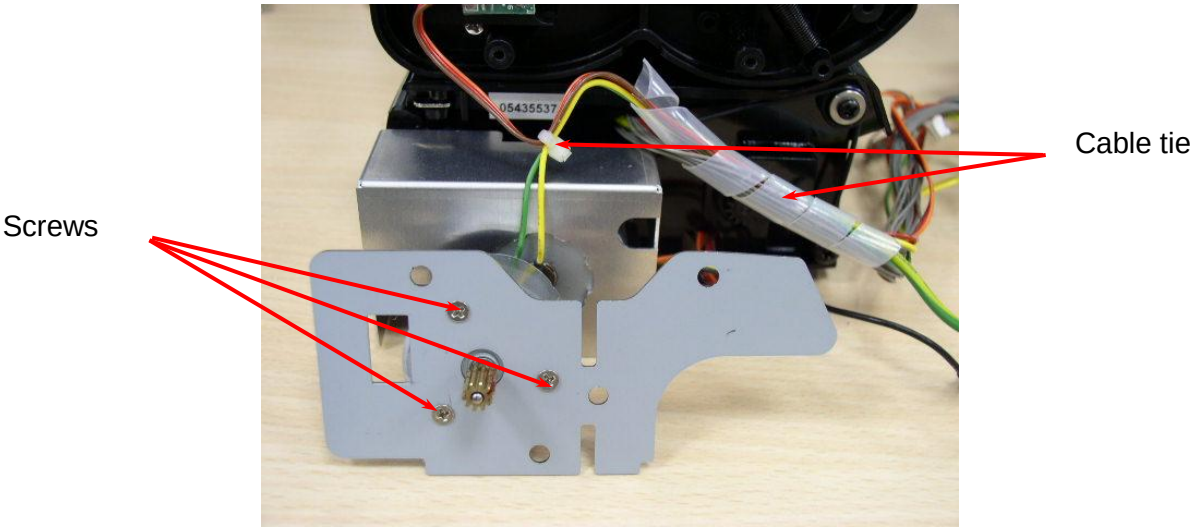
11. Remove the one screw.



12. Remove the three screws on DC motor fixture.



13. Remove the three screws used to fix DC motor on the fixture and remove the cable tie.



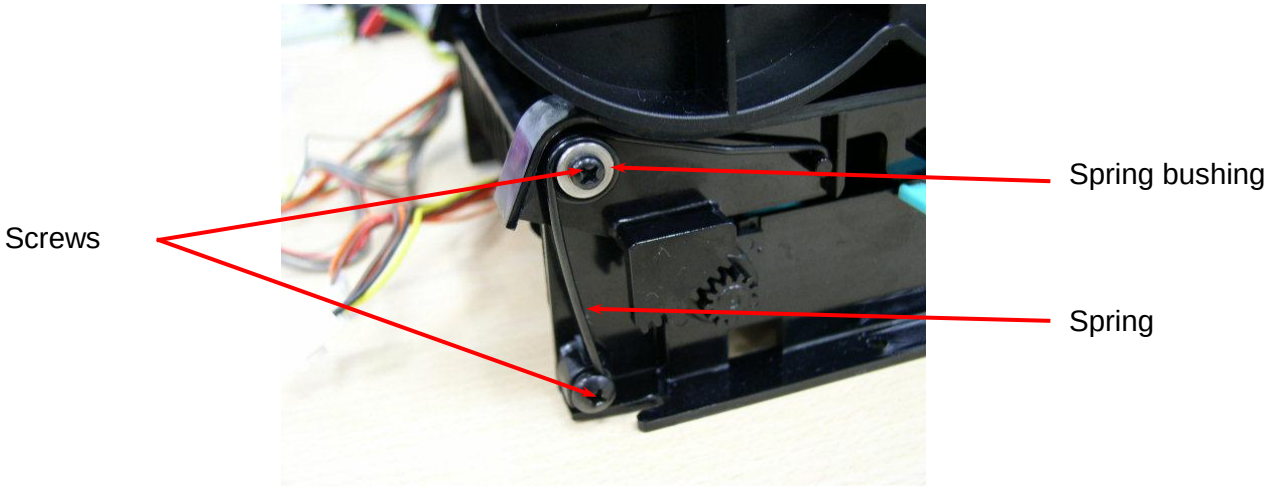
14. Replace the DC motor and pull out the cables in connector JP 37.

    Note: The colors of DC motor wires in connector JP 37 are yellow (outside) and green (inside).

15. Reassemble the removed parts in the reverse order of the removal.

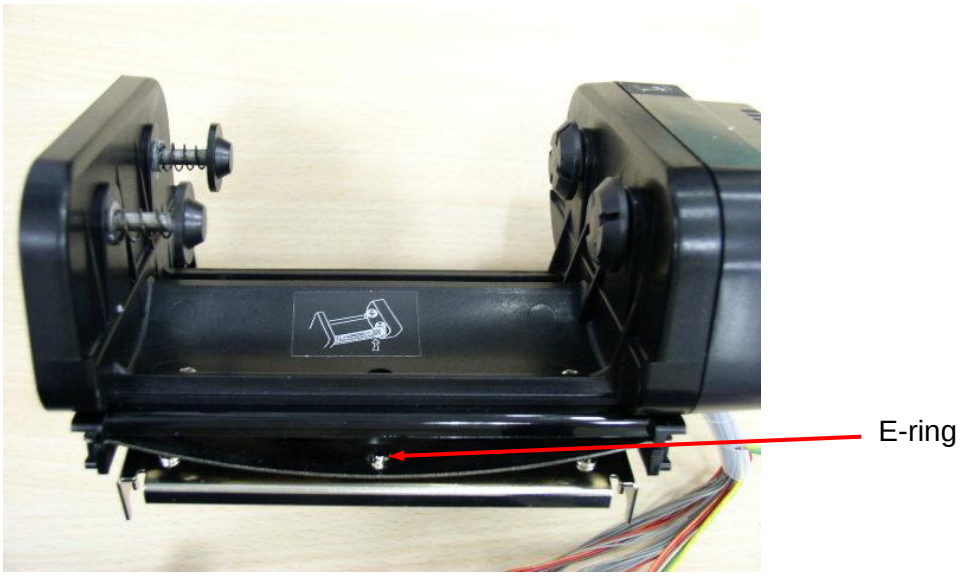
4.3 Print Head Replacement

1. Follow the instructions in Section 4.2 to take out the mechanism.
2. Open the print carriage.
3. Remove the screws, springs and spring bushing on both sides of the mechanism.

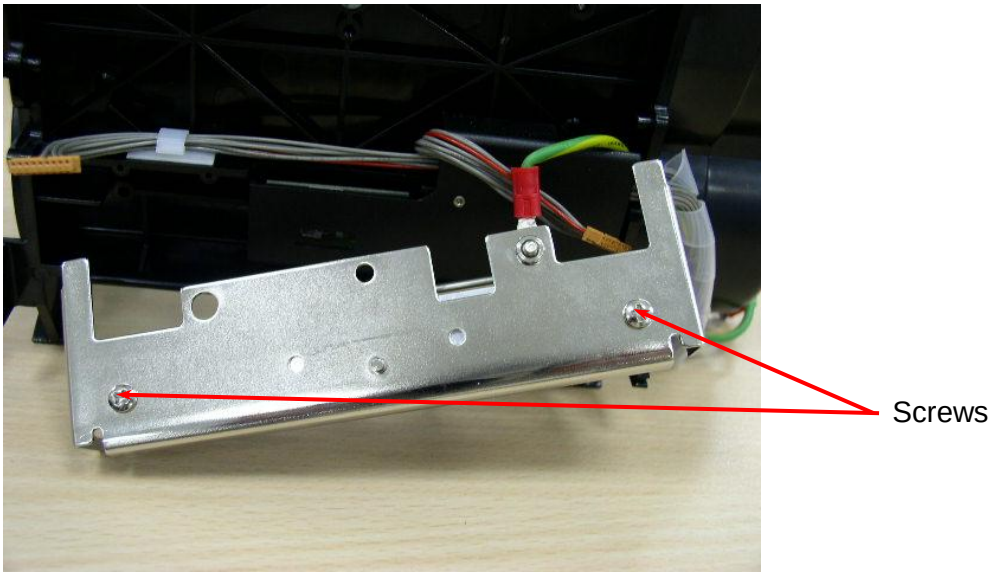


Note: The left side spring and the right side spring are different in shape. The right side spring has a straight end, when the left side spring has an end that is curved 90 degrees.

4. The main mechanism is divided into upper mechanism and lower mechanism.
5. Disconnect the print head cables.
6. Remove the e-ring at the mechanism, as shown.



7. Remove the screws.



8. Resplace the print head.
9. Reassemble the removed parts in the reverse order of removal.

Note:

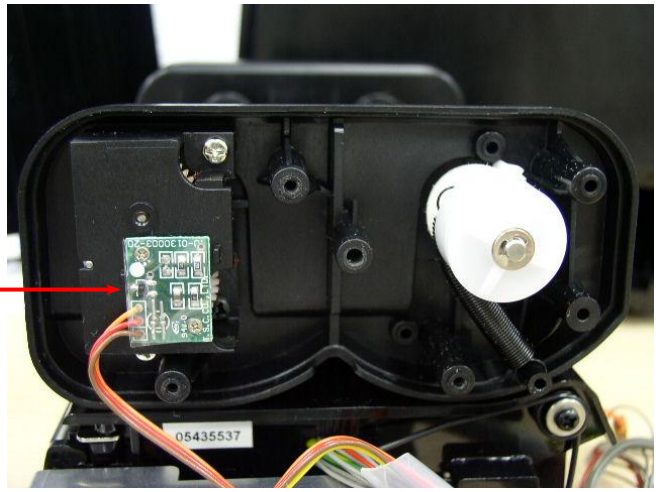
1. Tidy up the cable so that it does not protrude or interfere with the ribbon.
2. Do not touch the elements of the print head.
3. Do not disassemble the print head.

4.4 Ribbon Rewind Spindle Encoder Replacement

The encoder is installed on the gear box of DC motor, and is used to detect if the ribbon is unerringly rewound by the spindle. The encoder is connected to JP6 on the mainboard. Please switch the printer to thermal transfer mode. The multi-meter is used to measure the voltage of Pin2 (+5V). If the voltage changes continuously from 0 to 5 volts DC, the encoder is in condition. Otherwise, please follow the steps below to replace the encoder PCB.

1. Follow directions in Section 4.2 to remove DC motor and DC motor fixture.

DC Motor
Encoder

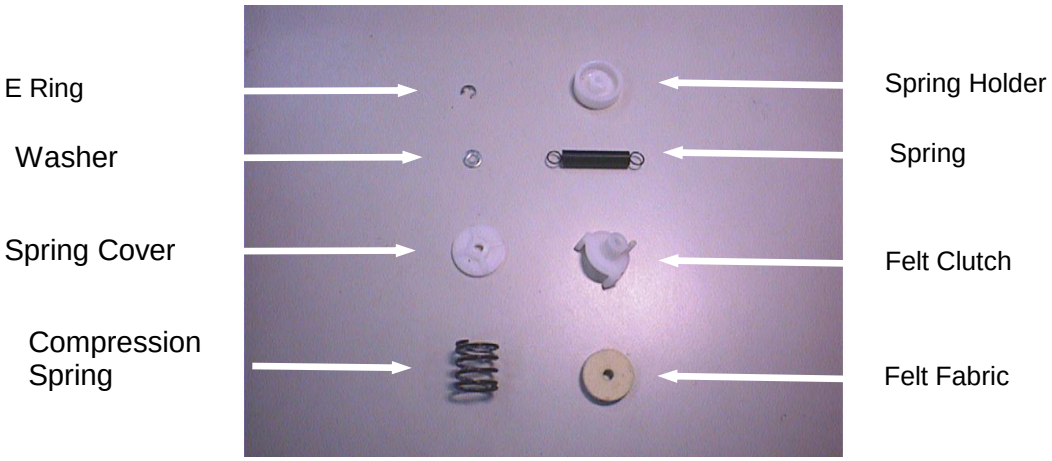


2. Remove the two flat tap screws and cable tie.
3. Replace the Encoder PCB.
4. Reassemble the removed parts in the reverse order of removal.

4.5 Felt Fabric Replacement

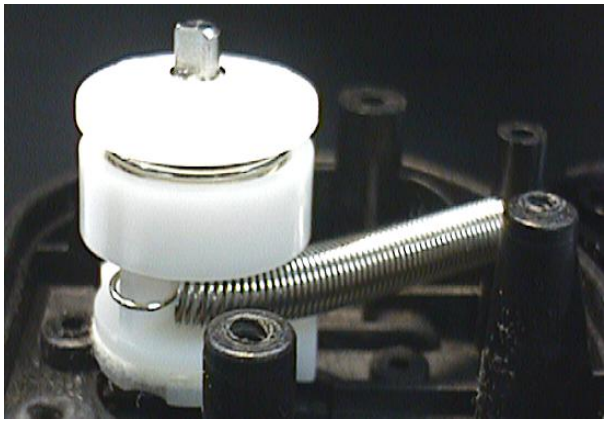
Felt Fabric is located in the ribbon supply spindle. It is used to tighten the ribbon to prevent it from getting wrinkled during printing. If the ribbon can not be tightened when label back feeds during printing, please replace with a new felt to secure the best printing quality. Follow the steps below to replace the felt fabric.

1. Follow the instructions in Section 4.2 to remove DC motor and DC motor fixture.
2. Remove the E-ring and washer on ribbon supply spindle.



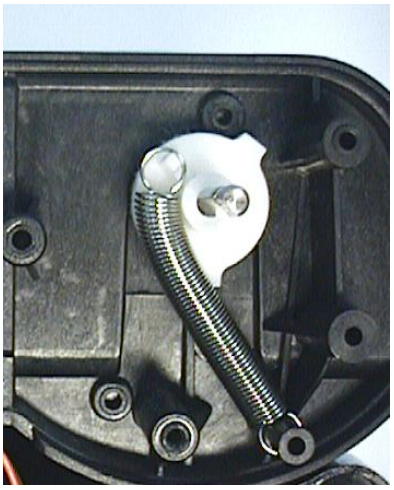
Components of the Ribbon Supply Spindle

3. Remove the spring cover, compression spring and spring holder.
4. Remove the spring, felt clutch and felt fabric.
5. Replace with a new felt.



Side View of the Ribbon Supply Spindle Assembly

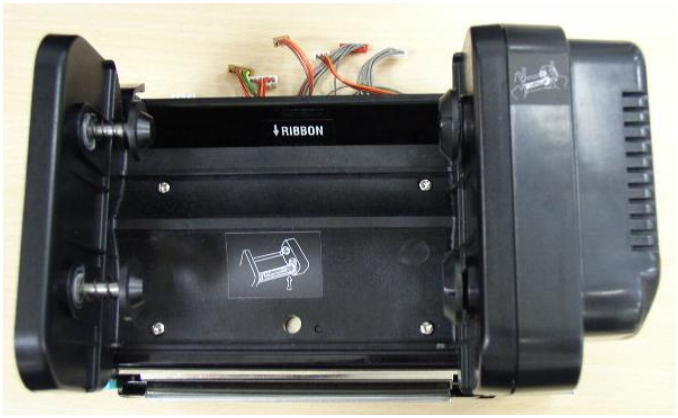
6. Reassemble the removed parts in the reverse order of removal.



**Front View of the
Ribbon Supply Spindle**

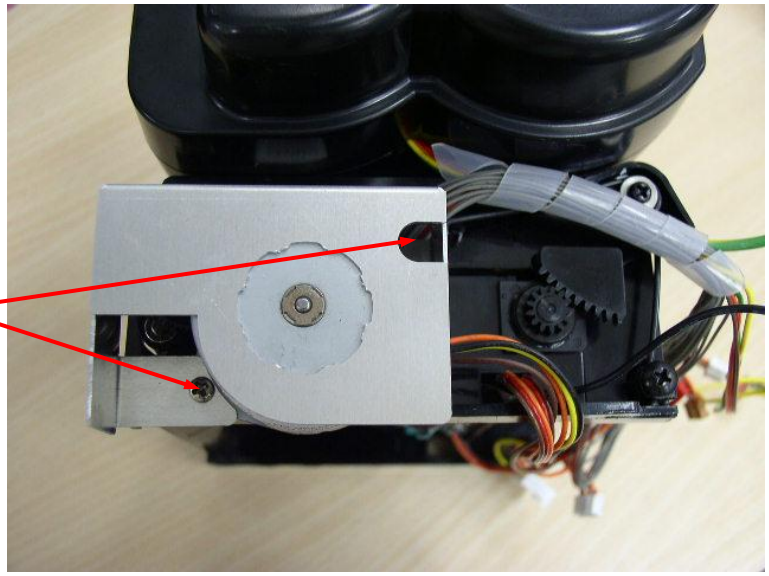
4.6 Stepping Motor Replacement

1. Follow the instructions in Section 4.2 to take out the mechanism.



2. Remove the two screws on stepping motor fixture.

Screws

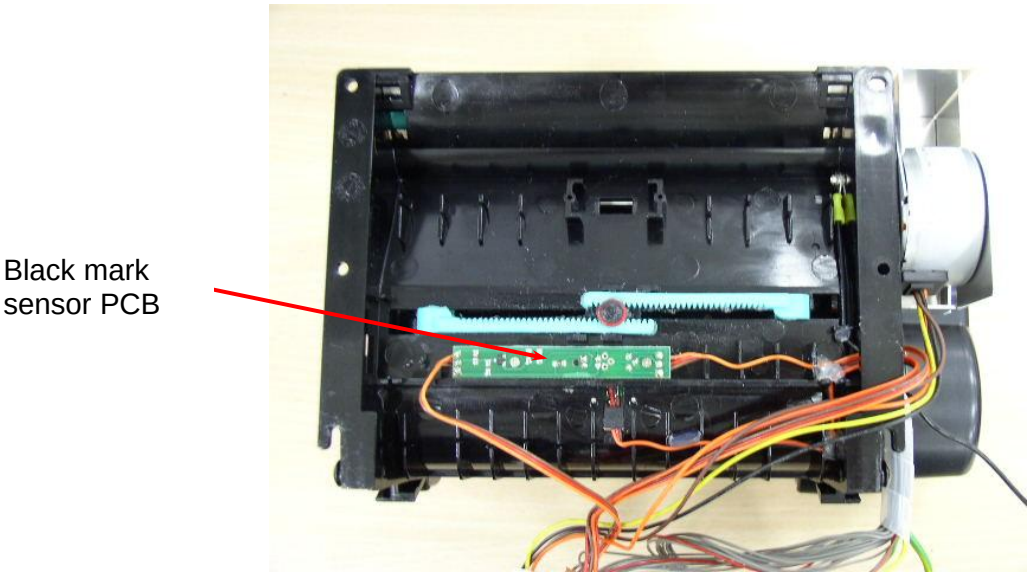


3. Replace the stepping motor and reassemble the removed parts in the reverse order of removal.

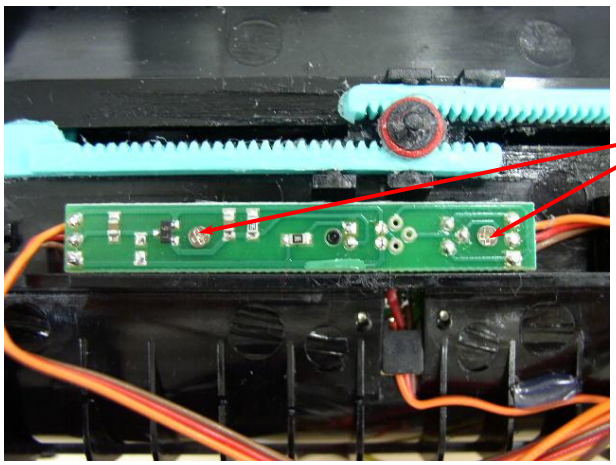
4.7 Black Mark Sensor / Gap Sensor (Receiver) Replacement

Black mark sensor is reflection type sensor. It is connected to JP4 (3 pin connector). A multi-meter is used to measure the signal of Pin2 to see if there is voltage variation when black mark is detected. Before conducting the test, please issue the BLINE command first. The printer will switch from gap sensor to black mark sensor. If there is no voltage variation, please follow steps below to replace the black mark sensor / gap sensor (receiver) PCB.

1. Follow the instructions in Section 4.2 to take out the mechanism.



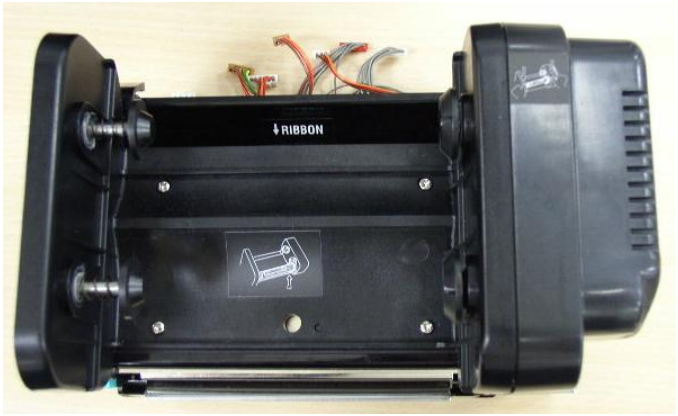
2. Remove two flat tap screws and black mark sensor PCB.



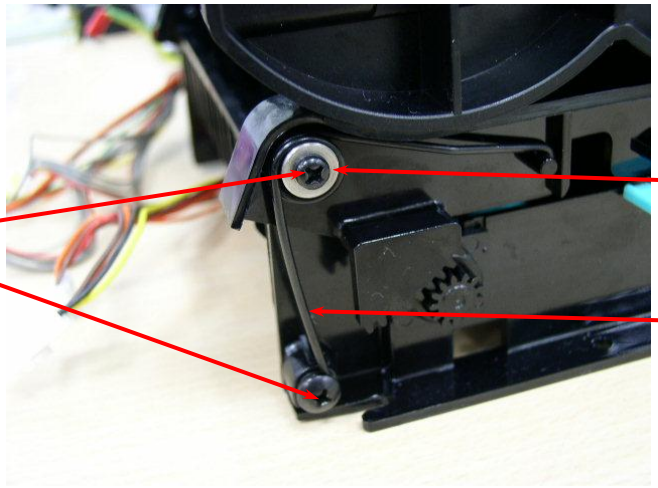
3. Reassemble the removed parts in the reverse order of removal.

4.8 Ribbon Sensor (Receiver) Replacement

1. Follow the instructions in Section 4.2 to take out the mechanism.

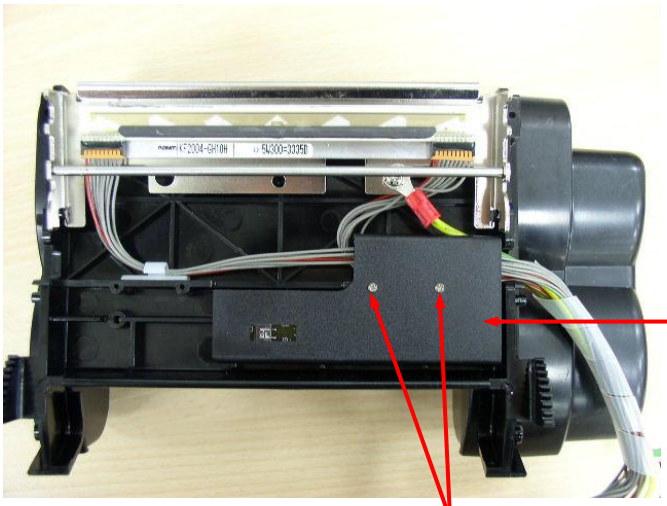


2. Open the print carriage.
3. Remove the screws, springs and spring bushing on both sides of the mechanism.

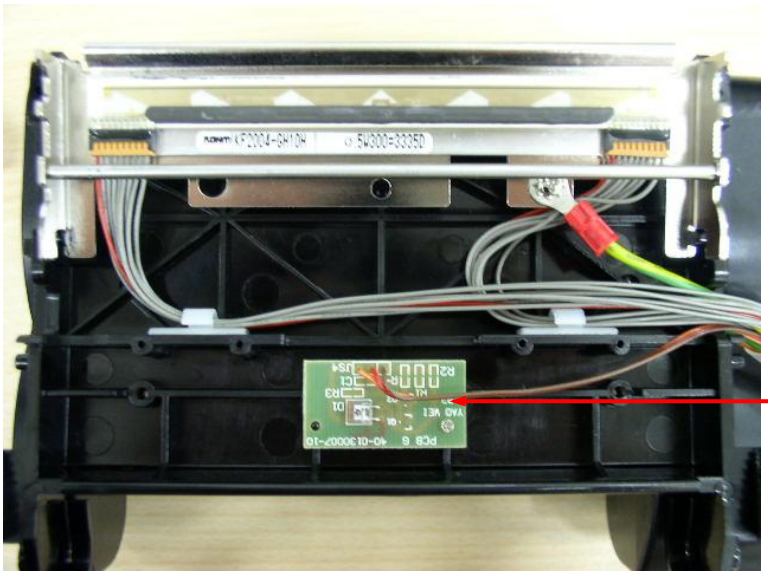


Note: The left side spring and the right side spring are different in shape. The right side spring has a straight end, when the left side spring has an end that is curved 90 degrees.

4. The main mechanism is divided into upper mechanism and lower mechanism.
5. And ribbon sensor (receiver) is located in the upper mechanism. Remove the screws on the ribbon sensor cover.



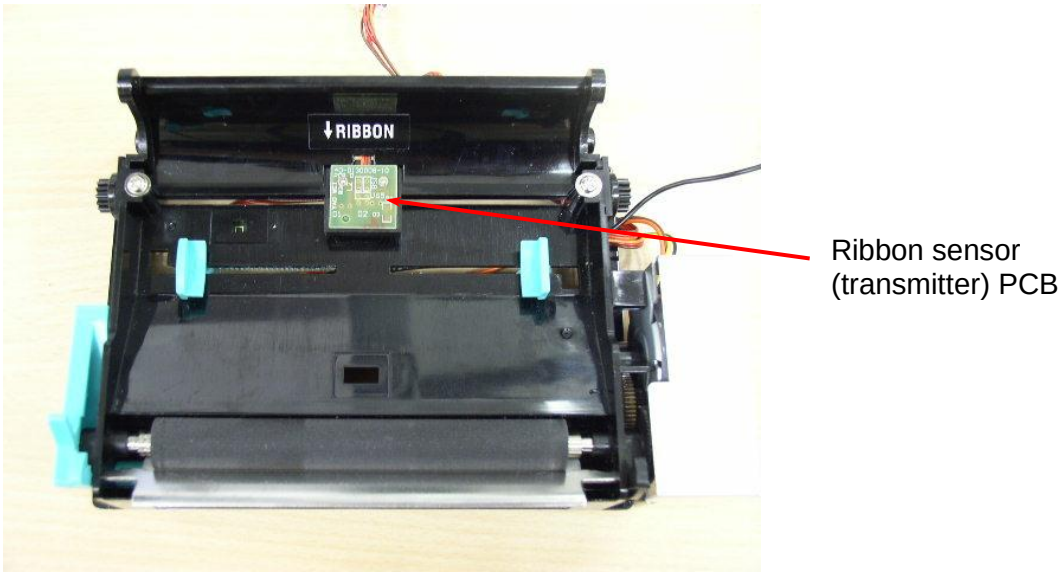
6. Replace with a new ribbon sensor PCB.



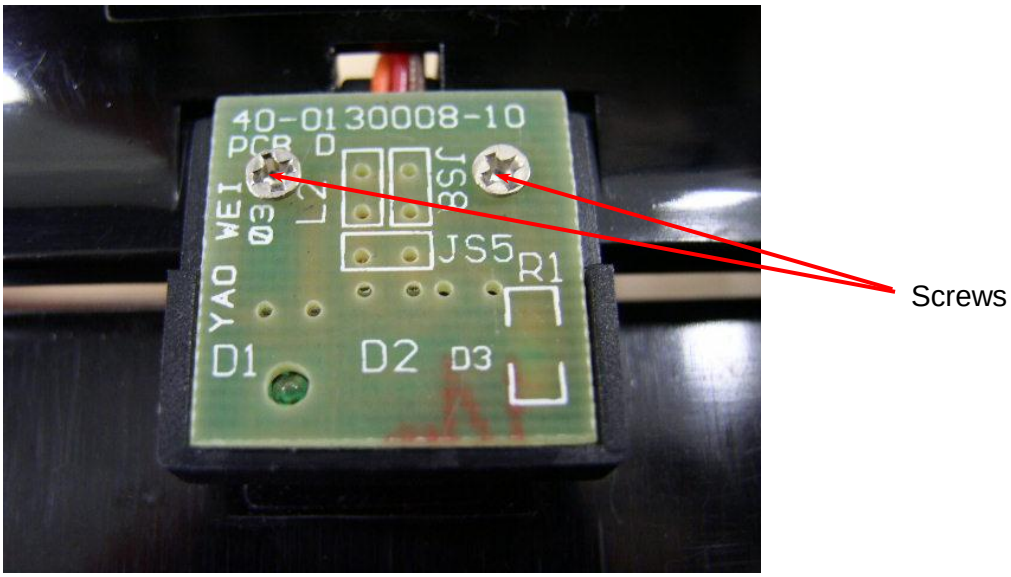
7. Reassemble the removed parts in the reverse order of removal.

4.9 Ribbon Sensor (Transmitter) / Gap Sensor (Transmitter) Replacement

1. Please follow the steps in Section 4.8 to separate the upper mechanism from the lower mechanism.
2. The ribbon sensor (transmitter) is located in the center of the lower mechanism.



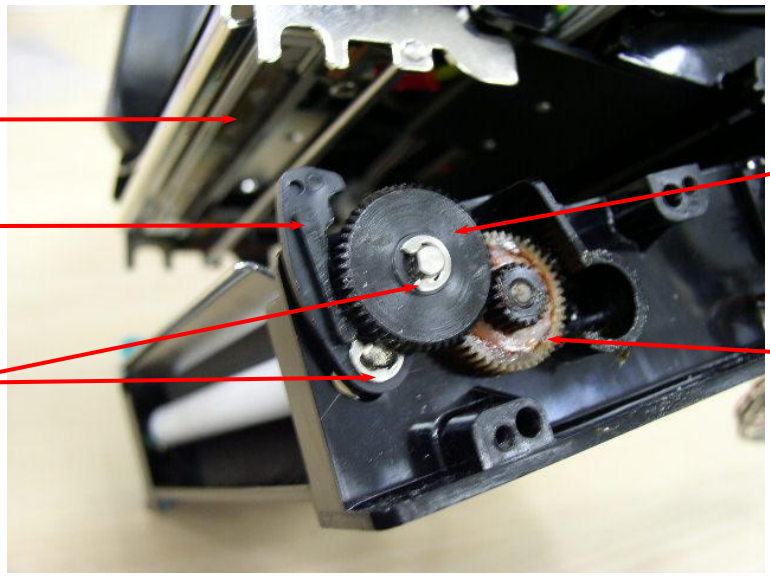
3. Remove the two flat tap screws



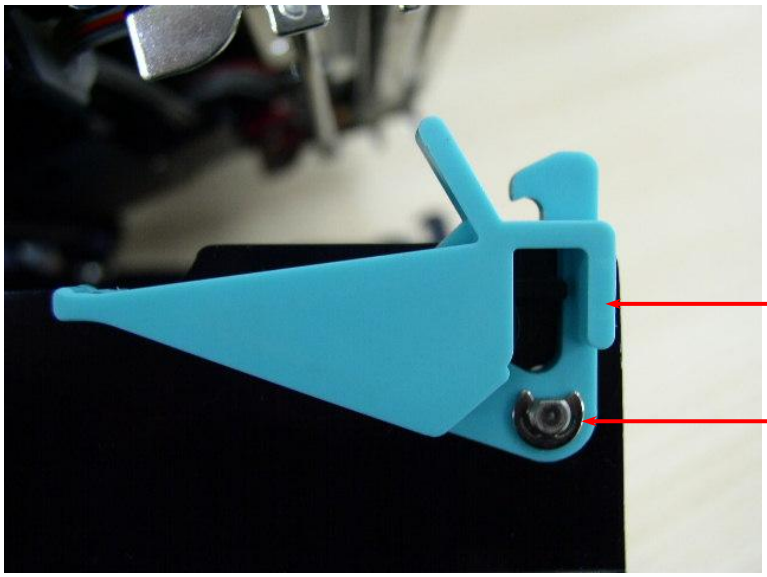
4. Remove the cable tie and sensor PCB.
5. Replace with a new PCB. Reassemble the removed parts in the reverse order of removal.

4.10 Platen Replacement

1. Follow the instructions in Section 4.6 to remove the stepping motor fixture and stepping motor.
2. Remove the E-ring and two gears.
3. Remove the E ring and the printer carriage release lever arm.

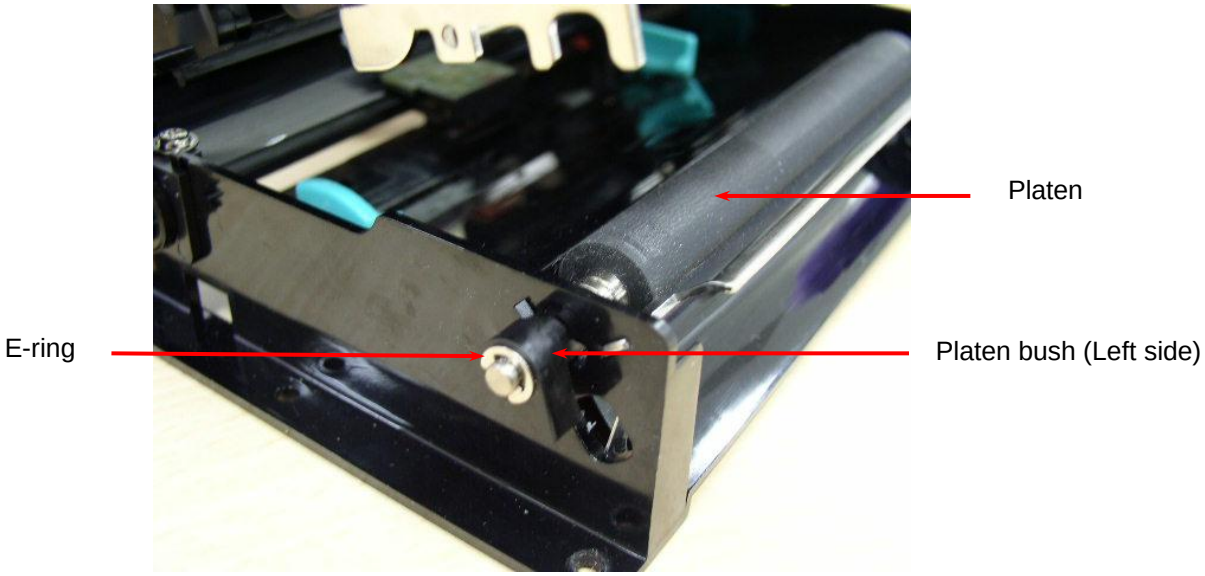


4. Remove the E-ring and the printer carriage release lever on the left side of the mechanism.



5. Remove the teflon tube and stripper rod.

6. Remove the E ring, the right side and left side platen bushes.



7. Move the platen to the right of the mechanism.
8. Replace the platen and reassemble the removed parts in the reverse order of removal.

5. TROUBLE SHOOTING

5.1 Trouble Shooting

Problems	Solutions
1. Ribbon does not advance.	Check the printing mode setting and reset the printer.
2. Poor print quality.	Clean the print head. Adjust the print density setting.
3. Only prints diagonal pattern in the self-test.	Ribbon and paper are incompatible. Use a different type of ribbon.
4. Power indicator light does not illuminate.	Check the connection of serial port cable.
5. On-line indicator light does not to illuminate.	Check the DIP switch setting and reset the printer. Check that power cord is properly connected.
6. Error indicator remains illuminated.	Out of paper or out of ribbon. Check the DIP switch setting Check the paper core, make sure it is installed on the ribbon rewind spindle. Press the FEED key. The error message will be printed out on the print media or sent out through RS-232 port. If there is no problem with direct thermal printing, but error occurs in thermal transfer printing. Please check the encoder of the DC motor.

5.2 Calibrate the Gap Register

Install the label.
Turn on the printer power while pressing the PAUSE button. The printer will calibrate the transparency of the backing paper and adjust the gap register.

5.3 Self-test

Install the label.
Turn on the printer power while pressing the FEED button, the printer will:
Print head checking pattern.
Calibrate the label length.
Print internal settings.
Initiate self-test.
Enter dump mode.

5.4 Ram Clear

Press the PAUSE and FEED button simultaneously for more than 3 seconds. The printer will clear the memory and reset the printer.
Be sure to calibrate the gap register with blank label before printing.

5.5 Diagnosis Operation Procedure

When the power is turned on without any button pressed, self diagnosis is performed automatically to test the available memory. If any error occurs during this period, the ERR light will flash.

Do the self test and inspect the test pattern to check if the thermal head is available.

5.6 Testing Sensors

A. Checking Ribbon Sensor

Switch the multimeter to the DC gear. Connect the black wire to DC GND, and the red wire to PIN2 of JP18.

1. When ribbon is detected between TX and RX of the ribbon sensor, the measured voltage should be 5 Vdc.
2. When ribbon is not detected between TX and RX of the ribbon sensor, the measured voltage should be 0 Vdc.

The ribbon sensor is normal if the checking complies with the two cases above. Or else, the ribbon sensor is out of order.

B. Checking DC Motor Encoder Sensor

Switch the multimeter to the DC gear. Connect the black wire to DC GND, and the red wire to PIN4 of U35.

1. When gap of the gear box is detected by the DC motor encoder sensor, the measured voltage should be 5 Vdc.
2. When gap of the gear box is not detected by the DC motor encoder sensor, the measured voltage should be 0 Vdc.

The DC motor encoder sensor is normal if the checking complies with the two cases above. Or else, the DC motor encoder sensor is out of order.

C. Checking Black Line Sensor

Switch the multimeter to the DC gear. Connect the black wire to DC GND, and the red wire to PIN2 of U2. Load black line label on the printer.

1. When black line is detected by the black line sensor, the measured voltage should be 3 Vdc.
2. When black line is not detected by the black line sensor, the measured voltage should be 0 Vdc.

The black line sensor is normal if the checking complies with the two cases above. Or else, the black line sensor is out of order.

UPDATE HISTORY

Date	Content	Editor
2009/10/6	Modify section 3.1	Camille
2011/1/25	Modify TSC address	Camille
2011/4/7	Modify section 3.2	Camille

TSC Auto ID Technology Co., Ltd.

Corporate Headquarters
9F., No.95, Minquan Rd., Xindian Dist.,
New Taipei City 23141, Taiwan (R.O.C.)
TEL: +886-2-2218-6789
FAX: +886-2-2218-5678
Web site: www.tscprinters.com
E-mail: printer_sales@tscprinters.com
tech_support@tscprinters.com

Li Ze Plant
No.35, Sec. 2, Ligong 1st Rd., Wujie Township,
Yilan County 26841, Taiwan (R.O.C.)
TEL: +886-3-990-6677
FAX: +886-3-990-5577